

**ROCKY FLATS PLANT  
EMD OPERATING  
PROCEDURES MANUAL**

**Manual No.: 5-21000-OPS-SW**  
**Procedure No.: Table of Contents, Rev 3**  
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**Effective Date: 02/20/92**  
**Organization: Environmental Management**

**THIS IS ONE VOLUME OF A SIX VOLUME SET WHICH INCLUDES:**

**VOLUME I: FIELD OPERATIONS (FO)**  
**VOLUME II: GROUNDWATER (GW)**  
**VOLUME III: GEOTECHNICAL (GT)**  
**VOLUME IV: SURFACE WATER (SW)**  
**VOLUME V: ECOLOGY (EE)**  
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By W. S. Sandelmark

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TITLE: EVENT-RELATED SURFACE-  
WATER SAMPLING

Approved by:

*James P. Hickey*

*2/20/92*

EMD, Manager

Date

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### 1.0 PURPOSE

The purpose of this procedure is to establish protocols for the processing of surface-water samples collected with automatic samplers during snowmelt runoff, storm runoff, and pond discharge events at stream gaging stations at Rocky Flats Plant (RFP).

### 2.0 SCOPE

These procedures apply to all Environmental Management Department (EMD) and subcontractor personnel performing sampling as part of the event-related surface-water monitoring program at RFP. Physical and water-quality variables included in this program are described in the Work Plan for Event-Related Surface Water Monitoring and Sediment Characterization (EG&G, 1991a). Procedures for the operation of the automatic samplers are described in Operations Procedure 5-21000-OPS-SW.11 - Operation and Maintenance of Stream Gaging and Sampling Stations (EG&G, 1991b).

### 3.0 REFERENCES

#### 3.1 Source References

- Isco, Inc., 1990a. Instruction Manual for Model 3700R/3740 Refrigerated Sampler.
- Isco, Inc., 1990b. Instruction Manual for Model 3700 Portable Sampler.

#### 3.2 Internal References

- EG&G Rocky Flats, Inc., 1991a. (Draft) Work Plan for Event-Related Surface Water Monitoring and Sediment Characterization.
- EG&G Rocky Flats, Inc., 1991b. EMD Operations Procedures Manual: 5-21000-OPS-SW: Surface Water.
- EG&G Rocky Flats, Inc., 1991c. EMD Operations Procedures Manual: 5-21000-OPS-FO: Field Operations.

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- EG&G Rocky Flats, Inc., 1990. (Draft) Environmental Evaluation Procedures for Waste Management Areas at Rocky Flats.

### 4.0 LIMITATIONS AND PRECAUTIONS

- 4.1 Sampling crews will be responsible for collecting, containerizing, labelling, and shipping of samples, as well as maintaining and preparing automatic samplers and flow meters for the next sampling event.

### 5.0 PREREQUISITES

- 5.1 Personnel executing the protocols described in this Operations Procedure should be instructed in the operation of the automatic samplers and flow-measurement equipment used at the gaging stations. At least one person on the field crew should have one (1) year of field experience sampling either surface water or groundwater. All field personnel should have satisfied Occupational Safety and Health Administration (OSHA) training requirements for work at hazardous waste sites (40 CFR 1910.120).

- 5.2 Each sampling crew will be required to obtain the following equipment prior to sampling:

- Sample containers/bottles
- Coolers
- Thermometer
- Blue ice
- Sample labels
- Chain-of-Custody forms
- Custody seals
- Decontamination equipment
- Sample preservatives (HNO<sub>3</sub>, HCl)
- Plastic baggies for containers and blue ice
- Strapping and clear tape
- Garbage bags
- Replacement tubing
- Black waterproof pen

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- Recharged nicad batteries
- Field data transfer equipment (laptop computer)

### 6.0 INSTRUCTIONS

#### NOTE

The following equipment is present at each gaging station included in the event-related surface water monitoring program:

- Isco Model 3700R Refrigerated Sampler
- Isco Model 3220 or 3230 Flow Meter

Some stations may also be equipped with:

- Isco Model 3700 Portable Sampler

#### 6.1 Removal of Composite or Sequential Sample Containers from Automatic Samplers

- 6.1.1 Upon arrival at the gaging station, unlock the instrument enclosure and remove the top and front panels to expose the automatic sampling equipment.
- 6.1.2 Open the door of the refrigerated sampler (Isco Model 3700R) or remove the top and center sections of the portable sampler (Isco Model 3700).
- 6.1.3 Remove the composite sample container or rack of sequential sample containers. The rack of sequential bottles should be removed from the 3700R by lifting the front edge of the rack to disengage it from the two ramps, and pulling it straight out of the refrigerator. Care must be taken not to catch the rack on the distributor arm. Bottles in the Isco Model 3700 sampler are directly accessible once the top and center sections of the sampler have been removed. In both cases, at the sampling crew's discretion, caps can be placed on bottles to prevent spillage during handling.

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### 6.2 Compositing of Samples

When the automatic sampler has collected samples in the sequential mode (using sequential sample containers), the samples that were collected during the event being studied may be combined to yield a representative composite sample. Two types of composite samples may be generated during this program. These are flow-weighted composites and equal-volume composites.

#### NOTE

Equal-volume composite samples may be generated by combining an equal volume of water from each of the sample containers that were filled during the event being sampled. Samples should be combined with an effort made to maximize total sample volume. This will be accomplished by using the entire volume of the sequential sample containing the lowest liquid level and using equal volumes from each of the other sample bottles.

- 6.2.1 Sequential samples should be capped and gently shaken immediately prior to compositing to resuspend any solids that may have settled to the bottom of the container.
- 6.2.2 Measure an equal volume of each sequential sample to be combined in a 1-liter glass graduated cylinder and pour this aliquot into the composite container. A glass composite container should be used for organic samples and a polyethylene or teflon composite container for metal or radionuclide samples.
- 6.2.3 Rinse the cylinder with distilled water between measurement of each sequential sample. Care must be taken to drain the cylinder as completely as possible after each rinse to avoid dilution of the sample. Rinsate from this procedure should be handled as described in Operations Procedure 5-212000-OPS-FO.07 - Handling of Decontamination Water and Wash Water (EG&G, 1991c).

#### NOTE

Flow-weighted composite samples will be generated by combining volumes of water from each of the sample containers proportional to the flowrate at the time each

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sample container was filled. Samples should be combined with an effort made to maximize the total sample volume. This will be accomplished by using the entire volume of the sample collected at the highest flowrate and using proportional volumes of sample from preceding and following bottles. For any given sampling time, the ratio of the flowrate at that time to the maximum flowrate during the sampling period multiplied by the volume of the sample collected at the maximum flowrate will give the flow-weighted volume for that sampling time to be used in the composite sample.

- 6.2.4 Remove strip-chart from flow meter or interrogate flow meter using lap-top computer to obtain a table of level or flowrate data versus time.
- 6.2.5 Using the level or flow data obtained in step 6.2.4, determine the maximum water level or flowrate at which a sample was collected during the sampling period.
- 6.2.6 For each sequential sample, calculate the ratio of the water level or flowrate at the time that the sample was collected to the maximum water level or flowrate.
- 6.2.7 For each sequential sample, multiply the ratio calculated in step 6.2.6 by the volume of sample collected at the maximum water level or flowrate. This will give the flow-weighted volume for each sample.
- 6.2.8 Sequential samples should be capped and gently shaken immediately prior to compositing to resuspend any solids that may have settled to the bottom of the container.
- 6.2.9 Using the flow-weighted volumes calculated in step 6.2.7, measure an aliquot from each sequential sample to be combined in a 1-liter glass graduated cylinder and pour this aliquot into the composite container. A glass composite container should be used for organic samples and a polyethylene or teflon composite container for metal or radionuclide samples.
- 6.2.10 Rinse the cylinder with distilled water between measurement of each sequential sample. Care must be taken to drain the cylinder as completely as possible after each rinse to avoid dilution of the sample. Rinsate from this procedure should be

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handled as described in Operations Procedure 5-212000-OPS-FO.07 - Handling of Decontamination Water and Wash Water (EG&G, 1991c).

### 6.3 Transfer of Samples to Laboratory Containers

- 6.3.1 Before sampling the water in the composite or sequential containers, containers should be capped and shaken to resuspend all solids which may have settled to the bottom. This procedure should be repeated frequently throughout the sampling procedure.
- 6.3.2 Using a funnel, if necessary, pour sample aliquots into the proper laboratory containers for the analyses to be performed. A stainless-steel funnel should be used when sampling for organic analytes, and a polyethylene or teflon funnel should be used for metals and radionuclides. Attachment 1 lists the types of containers and volumes required for the various analytes of interest.
- 6.3.3 Label sample containers, preserve samples as necessary (see Attachment 1 for preservative requirements), and place samples in coolers in accordance with Operations Procedure 5-21000-OPS-FO.13 - Containerizing, Preserving, Handling & Shipping of Soil and Water Samples (EG&G, 1991c).

### 6.4 Preparation of Automatic Samplers and Flow Meters for Subsequent Sampling Events

When the processing of surface-water samples for a single event is complete, the sampling crew should prepare the gaging station for the next sampling event. The Work Plan for Event-Related Surface Water Monitoring and Sediment Characterization (EG&G, 1991a) should be consulted for information on types of analytes to be sampled and whether the sampler should be set in the composite or sequential sampling mode.

- 6.4.1 Place clean composite or sequential containers in the Isco automatic sampler. When using composite sample bottles, the pump tubing should be inserted through the hole in the bottle lid. When changing from the sequential mode to the composite sample mode or vice versa, the distributor arm assembly in the sampler must be changed accordingly. Consult Operations Procedure 5-21000-OPS-SW.11

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- Operation and Maintenance of Stream Gaging and Sampling Stations (EG&G, 1991b), and the Instruction Manuals for the Isco 3700 (Isco, 1990b) and 3700R (Isco, 1990a) samplers for correct procedures for all facets of automatic sampler use and programming.

- 6.4.2 Program the automatic sampler for the next event. Consult Operations Procedure 5-212000-OPS-SW.11 - Operation and Maintenance of Stream Gaging and Sampling Stations (EG&G, 1991b), and the Instruction Manuals for the Isco 3700 (Isco, 1990b) and 3700R (Isco, 1990a) samplers for correct procedures for all facets of automatic sampler use and programming.

### 6.5 Decontamination of Automatic Sampling Equipment

- 6.5.1 Decontaminate all sequential and composite sample containers and prepare for reuse after they have been used during a sampling event. Procedures for proper cleaning of these containers are detailed in Operations Procedure 5-212000-OPS-FO.03 - General Equipment Decontamination, Section 5.4 (EG&G, 1991c).
- 6.5.2 Containerize and dispose all water used during decontamination in accordance with Operations Procedure 5-212000-OPS-FO.07 - Handling of Decontamination Water and Wash Water (EG&G, 1991c).
- 6.5.3 During normal sampling operations, the automatic sampler itself should not require cleaning. Cleaning should be performed as a quarterly maintenance activity. More frequent cleaning of the automatic samplers may be performed at the discretion of the field crew if the interior or exterior surfaces of the sampler appear soiled or dusty. When cleaning of the sampler is necessary, procedures outlined in Operations Procedure 5-212000-OPS-SW.11 - Operation and Maintenance of Stream Gaging and Sampling Stations (EG&G, 1991b) should be followed. Decontamination water from this procedure should be handled as described in Operations Procedure 5-212000-OPS-FO.07 - Handling of Decontamination Water and Wash Water (EG&G, 1991c).

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### 6.6 Documentation

6.6.1 Field crews should record summary information of daily activities in the Field Activity Daily Log. The field activity daily log narrative should create a chronological record of the sampling crew's activities, including the date and time each site is visited. Descriptions of sampling activities at each station, problems encountered, deviations from this Operations Procedure, and the number of Field Activity Daily Log Sheets used to record sampling crew activities for a given day will also be included. Log entries should include, at a minimum, the following information:

- Date and time of each entry or activity
- Names of sampling crew
- Names of all visitors to the site during field activities
- Gaging station ID
- Mode of automatic sampler (composite or sequential) upon both arrival and departure
- Method of sampling (sequential, equal-volume composite, or flow-weighted composite)
- Date and time sampling program started (first sample)
- Date and time sampling program ended (last sample)
- Number of samples collected
- Time interval between samples
- Bottle volume and material
- Amount of sample in bottle
- Stage at which sampling program initiated
- Type of event sampled
- Weather conditions
- Comments and observations

### 7.0 DISPOSITION

Authentication of the completion of this procedure is documented by signing the last page of the field activity daily log entry for each day.

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### Attachment 1: Sample Volume, Container, and Preservation Requirements for Analytes in the Event-Related Surface-Water Monitoring Program

Class of Analytes	Volume of Individual Sequential Samples Collected from Automatic Sampler	Volume Required for Analytical Methods	Preservative	Container Type
<b>Target Analyte List (TAL) Metals</b>	1 l	100 ml	HNO <sub>3</sub> to pH<2	Polyethylene
<b>Non-TAL Metals</b>	1 l	100 ml	HNO <sub>3</sub> to pH<2	Polyethylene
<b>Radionuclides</b>	1 l	200 ml	HNO <sub>3</sub> to pH<2	Polyethylene
<b>Target Compound List (TCL) Semi-Volatiles</b>	350 ml	2 x 1 l	Cool 4°C	Glass-Amber
<b>TCL Volatiles*</b>	350 ml	3 x 40 ml	Cool 4°C HCl to pH<2	Glass-VOA
<b>Pesticides/PCBs</b>	350 ml	2 x 1 l	Cool 4°C	Glass-Amber
<b>Indicators</b>				
<b>Total Dissolved Solids</b>	1 l	100 ml	Cool 4°C	Polyethylene
<b>Total Suspended Solids</b>	1 l	100 ml	Cool 4°C	Polyethylene
<b>pH</b>	1 l	100 ml	Cool 4°C	Polyethylene
<b>Nitrate</b>	1 l	100 ml	Cool 4°C	Polyethylene

\* Volatiles samples cannot be collected using automatic samplers and must be collected manually.